CHAPTER 2
Demand Estimates and Projections

Demand estimates for 2000 and projections for 2025 were made for six categories of water use. The category of *Public Water Supply* refers to all potable water supplied by water treatment facilities with projected average pumpages greater than 100,000 gallons per day (GPD) in 2025 to all types of customers, not just residential. The other five categories of water use are self-supplied. *Commercial and Industrial* refers to self-supplied business operations using 100,000 GPD (0.1 MGD) or more. *Recreational Self-Supply* includes landscape and golf course irrigation demand. The landscape subcategory includes water used for parks, cemeteries and other self-supplied irrigation applications with demands greater than 100,000 GPD. The *Domestic Self-Supply* category includes those households whose primary sources of water are private wells and those served by small utilities. *Thermoelectric Power Generation Self-Supply* water refers to replacement water for evaporative losses from cooling water at electrical plants. *Agriculture* includes water used to irrigate all crops, and for cattle watering and aquaculture. For 2000, the total assessed water demand for the Kissimmee Basin (KB) Planning Area was approximately 264 million gallons per day (MGD), and this is projected to grow to 397 MGD by 2025 (**Figure 3**). Conservation beyond current levels were not considered in this phase of the water supply plan, but are dealt with as part of the water source option analysis.

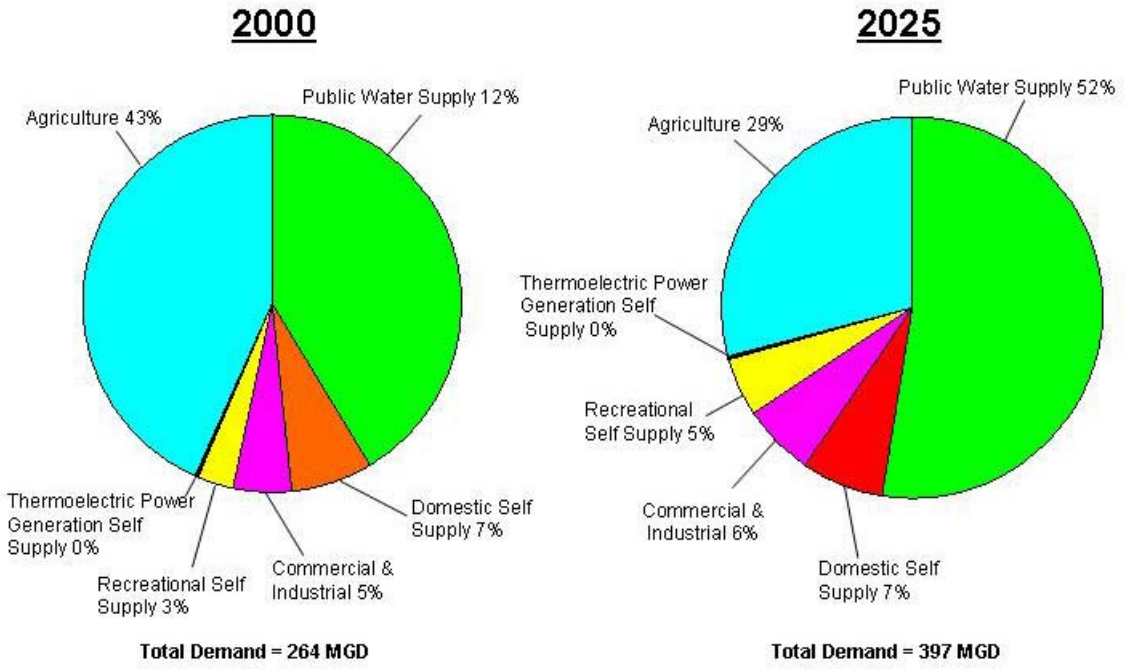

Figure 3. Overall Water Demands for 2000 and 2025 in the KB Planning Area.

From 2000 to 2025, the total water demand is projected to increase by 50 percent, from 264 to 397 MGD, as shown in **Table 2**. Public Water Supply is projected to increase by 89 percent, while agricultural demand is projected to increase by 2 percent. Agricultural water demand is currently the single largest category of use, but will be surpassed by PWS by 2025. In 2000, agriculture accounted for 43 percent of the total demand, and a moderate projected increase in agricultural demands combined with higher projected increases in urban use results in projected agricultural use declining to 29 percent of total demand by 2025. PWS demands are projected to increase from 41 percent to 52 percent of the overall water demands over the projection period (2000 to 2025).

Table 2. Overall Water Demands for 2000 and 2025 (MGD).

Category	Estimated Demands 2000 (MGD)	Projected Demands 2025 (MGD)	Percent Change 2000-2025
Agriculture	113.08	115.48	2%
Public Water Supply	109.64	206.73	89%
Domestic Self-Supply	18.81	29.29	56%
Commercial & Industrial Self-Supply	13.83	24.71	79%
Recreational Self-Supply	8.49	20.78	145%
Thermoelectric Power Generation Self-Supply	0.5	0.5	0%
Total	264.31	397.44	50%

URBAN WATER DEMAND

Urban water demand includes: (1) Public Water Supply provided by utilities; (2) Domestic Self-Supply; (3) Commercial and Industrial Self-Supply; (4) Recreational Self-Supply; and (5) Thermoelectric Power Generation Self-Supply. Public Water Supply was the largest component of urban water demand in 2000 (72 percent), followed by Domestic Self-Supply (12 percent), Commercial and Industrial Self-Supply (9 percent) and Recreational Self-Supply (6 percent). Urban water demand in the KB Planning Area in 2000 was estimated to be approximately 151 MGD and is projected to increase to about 282 MGD in 2025.

The driving force behind urban demand is population. Population numbers for 2000 were taken from the U.S. Bureau of the Census. Population projections for the year 2025 were obtained from the University of Florida Bureau of Economic and Business Research (BEBR), and are shown in **Table 3**. Population projections were used as a basis for developing urban demand projections. The total population of the planning area for year 2000 was 451,214 and is projected to increase by 100 percent to 900,964 in year 2025.

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Table 3. Population in the KB Planning Area, 2000-2025.

County Area	2000			2025		
	Total	Public Water Supply	Domestic Self-Supply	Total	Public Water Supply	Domestic Self-Supply
Southern Orange	220,065	198,008	22,057	496,578	450,881	45,697
Western Osceola	171,416	149,162	22,254	319,448	291,133	28,355
Eastern Polk	12,395	5,079	7,316	22,499	10,980	11,519
Eastern Highlands	9,501	1,722	7,779	13,755	2,492	11,263
Northern Glades	4,516	2,559	1,957	5,286	3,654	1,632
Western Okeechobee	33,321	12,205	21,116	43,358	21,123	22,235
Total Planning Area	451,214	368,735	82,479	900,964	780,263	120,701

Source: U.S. Bureau of the Census, 2001 and University of Florida Bureau of Economic and Business Research, 2002.

WATER SUPPLY

Public Water Supply and Domestic Self-Supply

The estimated water demand for Public Water Supply (PWS) and Domestic Self-Supply users (combined) in the KB Planning Area was 128.45 million gallons per day (MGD) in 2000. These water demands are projected to increase by 84 percent from 2000 to 2025 to a total water demand of 236.02 MGD (**Table 4**). The Domestic Self-Supply category includes: residents not living within areas served by utilities; residents living within areas served by utilities, but who are not connected to a utility; and residents served by utilities with historical or projected demands of less than 100,000 GPD (0.1 MGD). About 18 percent of the 2000 population was self-supplied and this is projected to decline to 13 percent by 2025, as self-supplied residents connect to regional utilities, and as future growth is connected to PWS systems. More specific information on utility served area populations and water demands, as well as the methodology used to develop these values is provided in **Appendix A**.

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Table 4. Public Water Supply and Domestic Self-Supplied Demand (MGD).

County Area	2000		2025	
	Public Water Supply	Domestic Self-Supply	Public Water Supply	Domestic Self-Supply
Southern Orange	76.34	6.91	145.89	15.06
Western Osceola	29.01	4.35	49.89	5.20
Eastern Polk	1.57	2.48	6.29	3.67
Eastern Highlands	0.23	1.04	0.31	1.41
Northern Glades	0.28	0.21	0.75	0.17
Western Okeechobee	2.21	3.82	3.60	3.78
Total	109.64	18.81	206.73	29.29

Commercial and Industrial Self-Supply

This category includes self-supplied commercial and industrial demands. Commercial and industrial demands supplied by public utilities are included with PWS demands. The projection methodology for Commercial and Industrial Self-Supply demand is discussed in **Appendix A**.

Table 5. Commercial and Industrial Self-Supplied Demand (MGD).

County Area	2000	2025
Southern Orange	6.33	14.28
Western Osceola	0.32	0.61
Eastern Polk	0.05	0.09
Eastern Highlands	3.15	4.56
Western Okeechobee	3.98	5.17
Total	13.83	24.71

Recreational Self-Supply

Recreational demands supplied by PWS utilities are included in the PWS demands. Recreational Self-Supply demands include demands for landscape and golf course irrigation. Golf course irrigation is the highest recreational water use.

Landscape

Demand projections for this section include irrigated acreage permitted for landscaping and recreation in all the county areas within the Kissimmee Basin (KB),

excluding golf courses (**Table 6**). In the KB during 2000, there were 2,351 acres of landscape self-supplied demand in the greater than 100,000 GPD category. The projection methodology is discussed in **Appendix A**.

Table 6. Landscape Self-Supplied Demand (MGD).

County Area	2000	2025
Southern Orange	4.02	9.07
Western Osceola	0.05	0.09
Eastern Polk	0.03	0.10
Eastern Highlands	0.01	0.02
Northern Glades	0.02	0.03
Western Okeechobee	0.06	0.08
Total	4.20	9.39

Golf Course

In 2000, there were 53 golf courses in the KB, of which 21 were self-supplied and 32 were irrigated with reclaimed water. The great majority of the golf courses (46) in the KB are in Southern Orange and Western Osceola Counties. There are no golf courses currently in Northern Glades County, and none are projected. Golf course self-supplied demands in the KB Planning Area are projected to increase from 4.30 MGD in 2000 to 11.44 MGD in 2025 (**Table 7**). All projected courses are considered potentially self-supplied in this analysis; however, use of reclaimed water is encouraged. Golf courses in the KB, projection methodology and the calculation of irrigation requirements are provided in **Appendix A**.

Table 7. Golf Course Self-Supplied Demand (MGD).

County Area	2000	2025
Southern Orange	3.12	5.49
Western Osceola	0.40	5.16
Eastern Polk	0.42	0.42
Eastern Highlands	0.18	0.18
Western Okeechobee	0.18	0.18
Total	4.30	11.44

The sum of the Landscape demands (**Table 6**) and the Golf Course demands (**Table 7**); yield the total Recreational Self-supplied demands, which are presented in **Table 8**.

Table 8. Recreational Self-Supplied Demand (MGD).

County Area	2000	2025
Southern Orange	7.14	14.57
Western Osceola	0.45	5.26
Eastern Polk	0.46	0.52
Eastern Highlands	0.20	0.21
Northern Glades	0.02	0.03
Western Okeechobee	0.24	0.25
Total	8.50	20.83

Thermoelectric Power Generation Self-Supply

Thermoelectric power plants may withdraw very large quantities of water for cooling purposes. The vast majority of this water is not consumed, in the sense that the same water may pass through the plant repeatedly, sequentially circulating through a series of ponds. There will, however, be some evaporative losses (mostly related to the heated water being kept in cooling ponds) that must be replaced from an external source beyond rainfall and runoff. The permitted supplemental withdrawal for thermoelectric power cooling (fresh water) was 0.46 MGD in 2000, and there are currently no known plans that would increase supplemental freshwater withdrawals for this purpose beyond that level.

AGRICULTURAL WATER DEMAND

Summary of Agricultural Demand

There are six categories of agricultural water demand analyzed in this section: (1) citrus; (2) vegetables, melons and berries; (3) field crops (sugarcane); (4) sod; (5) greenhouse/nursery; and (8) miscellaneous (cattle watering, aquaculture). Agricultural water demand was estimated for 2000 to be approximately 113 MGD. Citrus was by far the largest 2000 agricultural water demand (49 percent) and is followed by vegetables (17 percent).

Agricultural water demand is forecast to increase by 2 percent to about 115 MGD in the year 2025. Citrus percentage of the total agricultural water demands for 2025 are projected to decrease slightly, while sugarcane and ornamental nursery demands increase, and other crop demands remain relatively constant.

Pasture is seldom irrigated in the KB Planning Area. When irrigation does take place, it is invariably in a period of extreme drought, and is done to prevent the grass from dying. There are, however, some requirements for cattle watering. Descriptions of

the agricultural acreage in each county, projection methodology and the calculation of irrigation requirements, including data sources, are detailed in **Appendix A**.

Replacement quantities were assessed for counties for which there are currently permitted consumptive uses for aquaculture (fish farming); these operations withdraw water for circulation purposes and to replace evaporative losses, as described in **Appendix A**.

Table 9 shows the historical (2000) and projected (2025) acreages of the different categories of Agricultural Self-supplied demand in the KB Planning Area, as well as annual average agricultural irrigation demand by crop.

Table 9. Agricultural Water Demand (MGD) and Irrigated Acreage by Crop

Category	Estimated Demands 2000 (MGD)	Total Irrigated Acreage 2000	Projected Demands 2025 (MGD)	Total Irrigated Acreage 2025	% Change in Demands 2000-2025
Citrus	55.9	52,164	51.0	46,535	-9%
Vegetables	19.3	12,690	19.3	12,690	0%
Field Crops	10.0	3,338	14.8	5,438	48%
Sod	9.1	2,950	9.1	2,950	0%
Greenhouse/Nursery	7.2	3,160	9.7	4,247	34%
Miscellaneous	11.6		11.6		0%
Total Planning Area	113.1	74,302	115.5	71,860	2%

Citrus

Citrus is by far the dominant agricultural crop in the KB Planning Area, and occupies over 70 percent of the irrigated agricultural acreage in the region. Significant citrus acreage declines have been experienced in the northern areas of the KB (Southern Orange, Western Osceola and Eastern Polk Counties), while areas in the south of the KB (Northern Glades and Western Okeechobee) have had growth. Continued projected decline in citrus acreage in the north is somewhat offset by stability and increased acreage in the south, resulting in a slight projected overall decline in citrus acreage for the KB from 2000 to 2025. Declines in the north are largely the result of urban pressure and intermittent freezes combined with citrus market conditions.

Citrus acreage in the planning area is projected to decline from 52,164 acres in 2000 to 46,535 acres in 2025. This decline in acreage represents a decrease in average citrus irrigation requirements from 55.9 MGD in 2000 to 51.0 MGD in 2025. Acreage is projected to continue to decline more significantly in the north of the planning area.

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Vegetables, Melons and Berries

Vegetable crops grown in the planning area include squash, cucumbers, peppers, tomatoes, watermelons, potatoes and latin vegetables. Blueberries are also grown in Highlands County. Different types of vegetables are often grown interchangeably. In 2000, there were 12,960 acres of land used for vegetable, melon and berry production. This is projected to remain relatively constant through 2025, and represents an average irrigation requirement of 19.3 MGD.

Field Crops

Sugarcane is the only field crop with significant acreage in the KB. Glades and Highlands are the only counties in the KB Planning Area where sugarcane is grown commercially. In 2000, there were 3,338 acres of production, which were all in Glades County. Since 2000, there has been an expansion of about 2,100 acres, of which about 1,000 acres have been in Highlands County, and no further growth is anticipated. As a result of the cultivation practices used for sugarcane (ratoon and fallow), about 20 percent of the land used for sugarcane production is fallowed in any given year (detailed in **Appendix A**). This fallow land does not require irrigation and is not included in the demand projections presented here. The 2000 production of 3,338 acres had an associated average irrigation requirement of 10.0 MGD in 2000, and based on the addition 2,100 acres that have been planted since 2000; projected demands are 14.8 MGD through 2025.

Sod

In 2000, there were a total of 2,950 acres of irrigated sod production in the planning area, with an estimated irrigation requirement of 9.1 MGD. There is additional sod harvested from pasture land, but this is rarely irrigated. Sod production is projected to remain at its 2000 acreage through 2025.

Greenhouse/Nursery

In 2000, there were 3,160 acres of greenhouse/nursery operations in the planning area, and this is projected to increase to 4,247 acres by the year 2025. This includes ornamental nursery operations, as well as the caladium farms. Average demands by nurseries in the planning area are projected to increase from 7.2 MGD in 2000 to 9.7 MGD in 2025.

Miscellaneous

Demand for cattle watering and barn washing is associated with cattle production (which is in turn associated with pasture acreage). This was assessed at 9.6 MGD in 2000 and is projected to remain stable through 2025.

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Aquaculture (fish farming) withdraws water for circulation purposes and to replace evaporative losses. Withdrawals to replace evaporative losses are approximately 1.5 MGD, and projected to remain stable throughout the projection period.

DEMAND METHODOLOGY

Public Water Supply and Domestic Self-Supply

The urban demand assessment for Public Water Supplied (PWS) and Domestic Self-supplied population involved an intensive Geographic Information System (GIS) analysis using population data from the U.S. Bureau of the Census and the University of Florida Bureau of Economic and Business Research (BEBR).

For the PWS and Domestic Self-Supply assessment, populations residing within areas served by utilities were assessed by overlaying Census data onto utility served area boundaries. The next step involved determining water use rates in the utility served area boundaries using per capita water use. Per capita water use rates were assessed using the 2000 water withdrawals for each utility reported by the U.S. Geological Survey (USGS) and dividing that number by the 2000 population determined to be in each utility served area. The resulting 2000 per capita water use rates were held constant to project 2025 drought level water demand (since 2000 was a drought year, exceeding the 1-in-10 year planning goal). Populations in each Census block were projected to grow proportionally with the relevant growth rates specified by the county's Traffic Analysis Zone analysis, up to the county population control total of the BEBR medium population projections (BEBR 2002). The anticipated 2025 utility served boundaries were then superimposed on the 2025 population data, assigning projected populations to utilities, and then each utility's 2000 per capita rate was applied to yield projected drought year demands for utilities. Drought year demand levels were then modified by the proportional difference between county per capita usage for the county in 2000 and the most recent average rainfall year – as reported by the USGS - up to a maximum of a 6 percent difference.

The current plan relied on Domestic Self-Supply data from the 2000 plan for overlay with 2000 Census data. The previous plan had access to 1990 Census data that included "source of water" on the Census long-form questionnaire. This item was removed from the 2000 Census long-form questionnaire. The current plan, therefore, used the Domestic Self-Supply data from the previous plan, where the same utilities existed. Where new utilities were added to the assessment, the 1990 Census data were overlaid onto the 2000 service area boundaries for an approximation of self-supplied population that will be converted to PWS in this 2005 Update.

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Self-Supplied Categories of Use

The remaining categories of water use are self-supplied and include Commercial and Industrial, Recreational, Thermoelectric and Agricultural. The methodology for Commercial and Industrial remains the same as in the 2000 Plan. The 2000 water demands were as reported by the USGS, and projections were made using population growth rates from the relevant counties.

The Recreational and Agricultural Self-Supply demand calculations did have a fundamental change in methodology. The 2000 Plan used a modified Blaney-Criddle model to estimate supplemental requirements for irrigation, while the 2005 Update is using the Agricultural Field Scale Irrigation Requirement Simulation (AFSIRS) model to assess irrigation demands. Differences between the models are discussed below.

The agricultural demand assessment involved establishing acreages through collecting data from the Florida Agricultural Statistics Service, GIS land use maps and the Institute of Food and Agricultural Sciences (IFAS). Following the establishment of acreages by crop types, acreage projections were developed using a mix of statistical and industry feedback information, and agricultural water demands were assessed based on those acreage projections. Historical (2000) and projected (2025) agricultural acreage information was reviewed by IFAS extension agents from six counties (responses pending).

CHANGES FROM THE 2000 KB WATER SUPPLY PLAN

There were several changes made in the demand assessment and projection methodology from the 2000 Plan to the 2005 Update. These are summarized below:

Census blocks used instead of Census block groups. The population analysis conducted in this 2005 Update used census blocks; whereas block groups were used 2000 Plan. A Census block is the smallest Census geographic area, normally bounded by streets and other prominent physical features. A Census block has a higher resolution than a group of blocks (Census block group), therefore, use of blocks rather than block groups provide a higher level of precision.

A decreased water use threshold for Public Water Supply utilities from 500,000 to 100,000 gallons per day. This had the effect of increasing the number of Public Water Supply utilities analyzed in the 2005 Update.

Supplemental irrigation needs determined using the AFSIRS model versus a modified Blaney-Criddle model. Both of these models estimate evapotranspiration (ET) in order to derive supplemental irrigation requirements for agricultural crops and outdoor irrigation. However, in south Florida, the Blaney-Criddle model tends to overestimate ET, which is the driving component

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of supplemental irrigation. As a result, the Blaney-Criddle model has the potential to overestimate supplemental irrigation requirements. To address this, District staff began utilizing the Agricultural Field Scale Irrigation Requirement Simulation (AFSIRS) model as the regional water supply plans were updated. The AFSIRS model yields supplemental irrigation requirements that better reflect historic use patterns, and are generally lower than the modified Blaney-Criddle model on an annual basis.

RESULTS – COMPARISON WITH 2000 PLAN

This section includes a comparison of the population and water demands between the 2000 Plan and the 2005 Update. Overall water use demand projections decreased from the 2000 Plan projections by 39 percent (**Table 10**). The most significant decrease in projections of water use is for the Agricultural Self-Supply category, followed by Recreational Self-Supply category.

Table 10. Comparison of the Population and Water Demands Projections in the 2000 Plan versus the 2005 Update.

	2000 KB Plan Update for 2020	2005 KB Plan Update for 2005	% Change 2000 Plan (2020) vs. 2005 Update (2025)
Population	686,696	900,964	312
Water Use	663.42	397.44	-40%
Public Water Supply (MGD)	145.30	206.73	42%
Domestic Self Supply and Small Public Supply Systems (MGD)	11.80	29.29	148%
Commercial & Industrial Self-Supply (MGD)	5.80	24.71	326%
Recreational Self-Supply (MGD)	23.82	20.78	-13%
Thermoelectric Power Generation Self-Supply (MGD)	Not Addressed	0.46	
Agriculture Self-Supply (MGD)	476.70	115.48	-76%

Table 10 shows a comparison of the level of demands that were analyzed in the 2000 Plan for a 2020 projection horizon, versus the demands projected in the 2005 Update for a 2025 projection horizon. The demand numbers differ for the following reasons:

- Agricultural acreage growth trends (particularly citrus in the south of the KB) have leveled off. This was not the observed trend at the time of the 2000 Kissimmee Basin Water Supply Plan. For example, the projection for irrigated agricultural acreage in the 2000 Plan anticipated a significant increase in citrus acreage (the

dominant crop in the region), whereas the 2005 Update anticipates a modest decline.

- At the time of the development of the 2000 Kissimmee Basin Water Supply Plan there were several agricultural corporations in the region that expressed significant expansion plans for crops that would require irrigation; however, these plans were not fully acted upon.
- The irrigation model used in the 2000 Plan was a modified Blaney-Criddle model, whereas the AFSIRS model is used for the 2005 Update. Use of that version of the Blaney-Criddle model generally results in a higher per acre irrigation than AFSIRS.

Uncertainties Associated with Demand Projections

Demand projections are based on the extrapolation of trends, circumstances and industry intensions that change over time. For example, observed and projected growth in citrus acreage during the preparation of the 2000 Plan has since reversed into a decline. There have been some acreage increases in ornamental nursery, but not of the same magnitude as the reduction in citrus acreage. Trend changes such as this are incorporated in the five-year updates to the plan.

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